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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/582,049	09/18/2000	Marcel Garnier	GARNIER-1	6845

7590

03/13/2002

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EXAMINER

NGUYEN, NGOC YEN M

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 03/13/2002

8

Please find below and/or attached an Office communication concerning this application or proceeding.

MIF-8

Office Action Summary

Application No.

09/582,049

Applicant(s)

GARNIER ET AL.

Examiner

Ngoc-Yen M. Nguyen

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 7-10 is/are rejected.
- 7) ☒ Claim(s) 5 and 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

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DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuge et al (5,182,091) in view of DE 29 24 584.

Yuge '091 discloses a method for purifying silicon which comprises directing a plasma jet of an inert gas toward the surface of molten silicon held in a container lined with silica or a silica based refractory and stirring said molten silicon, said inert gas being mixed with 0.1-10 vol% steam (note claim 1). Yuge '091 discloses that it was found by small scale experiments that the adequate stirring of molten silicon reduces the loss of silicon below 10% during the purification process even though the amount of steam added to the plasma gas is increased to 10 vol%. Thus the stirring of molten

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silicon is essential. A better result is obtained when induction heating is applied to the molten silicon (note column 3, lines 37-44). Thus, Yuge '091 fairly teaches that induction heating is carried out not only to melt the silicon but also during the plasma treating step to improve the stirring of the molten silicon.

Yuge '091 discloses that although the process employs a plasma torch, which generates an arc therein, it is possible to make modification by applying the voltage across the plasma torch and the molten silicon (note column 3, lines 1-4).

The difference is Yuge '091 does not specifically disclose plasma, which is generated by an inductive plasma torch.

DE '584 discloses a process of producing silicon for solar cells by introducing silica or Si with a higher degree of contamination into a reducing gas atmosphere in a plasma. The plasma is preferred to be an inductive plasma instead of an arc torch in order to avoid contaminating the molten silicon (note English abstract and page 4, last full paragraph).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made use an inductive plasma instead of an arc plasma, as suggested by DE '584, in the process of Yuge '091 because the use of the inductive plasma would avoid contaminating the molten silicon.

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuge '091 in view of DE '584 and Hiratake et al (4,048,436).

Yuge '091 and DE '584 are applied as stated above.

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Yuge '091 fairly teaches the inductive crucible and DE '584 the inductive plasma torch. Yuge '091 also disclose a bottom opening 13 (note Figure 4). The silica 1a in the bottom opening 13 is kept cooled and solidified, and it permits the electric current to flow to the water cooled electrode. This considered the same as the claimed electromagnetic valve.

The difference is Yuge '091 does not disclose a removable magnetic yoke between the plasma torch and the crucible.

Hiratake '436 discloses that an inductively produced plasma can be enlarged by subjecting the plasma to the rotating magnetic field generated by the rotating magnetic field generating means 44e. Because the plasma is more heated at its surface rather than its interior by induction heating on account of the skin effect, the rotating magnetic field has an effect to heat the surficial portion rather at a low temperature by its nature besides the enlargement of the plasma. This effect further contributes to the homogeneous heating of the plasma (note Figure 10 and column 6, lines 24-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made enlarge the plasma in Yuge '091, by using a rotating magnetic field, as suggested by Hiratake '436, because an enlarged plasma with a wide and homogeneous temperature distribution can be obtained and the wider the plasma the more surface it can treat.

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Claims 5-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art does not teach or suggest the step of inverting the melt stirring direction and injecting an element enabling doping of the silicon.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (703) 308-2536. The examiner is currently on a Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on (703) 308-1164. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



N. M. Nguyen
Primary Examiner
Art Unit 1754

nmn
March 10, 2002